



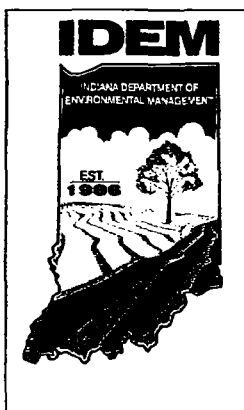
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**REFERENCE: 50**

IDEM. Standard Operation Procedures, Chemistry Support Soil Sampling for Volatile Compounds

June 5, 2007. 13 pages

0001



**Chemistry Support Soil Sampling for Volatile Compounds**  
**P-003-OLQ-S-CH-07-S-R0**

**Standard Operating Procedure**

**Office:** Office of Land Quality

**Branch:** Science Services

**Section:** Chemistry

**Revised:** NA **Revision Cycle:** Every 2 years

**Effective date:** Upon Approval

**Scope of operations**

This Standard Operating Procedure (SOP) outlines the collection of soil samples for volatile compounds as it relates to the Quality Assurance Project Plan (QAPP). This SOP is limited to the actual sample collection only and does not cover Access Agreements, Sample Request Sheet Sign-Off, Contract Laboratory Set-Up, Field Documentation, Sample Shipping, and Data Verification and Validation, which are under separate individual SOPs.

**Scope of applicability**

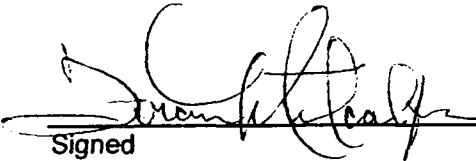
This SOP applies to all OLQ staff that will be collecting soil samples for volatile compounds during field sampling events.

## Authorized Signatures

I approve and authorize this Standard Operating Procedure:

### Section QA Contact

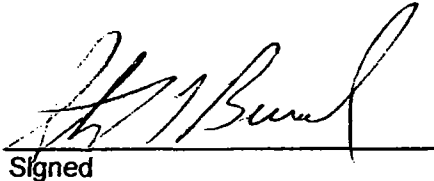
Fran Metcalfe  
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### Section Chief(s)

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5/17/07  
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Barry Steward  
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### Branch QA Coordinator

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### Branch Chief(s)


Laura Steadham  
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### Branch Chief, Remediation Services

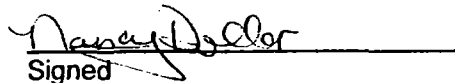
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### Branch Chief, Permits

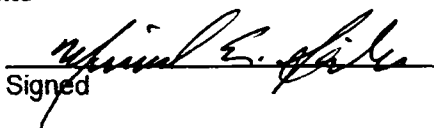
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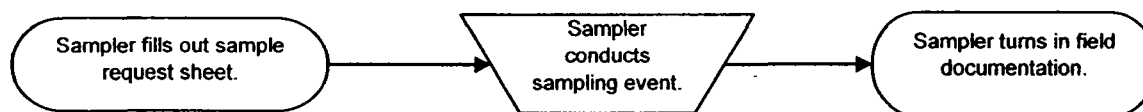
**Branch Chief, Compliance and Response**\_\_\_\_\_  
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Date**Branch Chief, Compliance and Response**BRUCE KIZER  
Typed/PrintedBruce Kizer  
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Date**OLQ Assistant Commissioner**BRUCE H PALIN  
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Signed5/30/07  
Date**IDEM Quality Manager(s)**

This Standard Operating Procedure is consistent with agency requirements.

Lowell Jackson  
Indiana Department of Environmental Management  
Quality Assurance Program  
Planning and Assessment6/5/07  
Date

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**1. Overview work flow chart****2. Definitions**

**Agency:** The Indiana Department of Environmental Management

**Assistant Commissioner:** An Assistant Commissioner with the Indiana Department of Environmental Management. *(Universal)*

**“Authorized”** – Established by official authority and usage; as with a policy, standard operating procedure (SOP), or quality assurance project plan (QAPP) that is signed and dated.

**Branch Chief:** A management level position in one of the Program Area branches in the Agency. *(Universal)*

**Chain-of-Custody:** An unbroken trail of accountability that ensures the physical security of samples, data, and records.

**Chemistry Gatekeepers:** The person in the Chemistry Section of OLQ that is the site Chemist (if there is one), or any Environmental Chemist 1 (EnvChem1) or Compliance and Response Branch Senior Environmental Manager 1 (SEM1).

**Environmental Chemist (EC):** Staff level position within the chemistry section.

**Environmental Chemist Supervisor (ECS):** A first-level Agency supervisor responsible for managing non-supervisory Agency staff. *(Universal)*

May 4, 2007

**Environmental Samples:** Any media taken from a specific location that will be analyzed by a laboratory for data acquisition purposes.

**Laboratory:** The facility authorized by the Indiana Department of Administration or the Indiana Department of Health (ISDH) that performs the analysis of environmental samples for the Office of Land Quality.

**Office of Land Quality (OLQ):** One of the major departments within the Indiana Department of Environmental Management (IDEM).

**Personal Protection Equipment:** Personal protective equipment, or PPE, is designed to protect employees from serious workplace injuries or illnesses resulting from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. See 29 CFR 1910 and Agency P-001-OLQ-X-XX-06-P-R1.

**Program Area:** The OLQ program areas include, but are not limited to, the Leaking Underground Storage Tank (LUST) Program, the State Cleanup Program, the Brownfields Program, the Federal Programs, the Site Assessment Program, the Voluntary Remediation Program, the Permitting Programs, and the Compliance Programs.

**Project Manager (PM):** Person who coordinates, oversees, and makes programmatic recommendations with regard to work that includes the collection, use, or reporting of environmental data. For the purposes of IDEM, the work may involve activities such as permitting, monitoring, investigation, or remediation.

**Quality Assurance (QA):** An integrated system of management activities involving planning, implementation, documentation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the client. (A-005-OEA-06-P-R0)

**Quality Control (QC):** The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality. In other words, QC involves measuring the "thing produced" against a standard to ensure it is a quality product that meets the identified need. (A-005-OEA-06-P-R0)

**Quality Assurance Project Plan (QAPP):** A document describing in comprehensive detail the necessary quality assurance, quality control, and other technical activities to ensure that the results of the work performed will satisfy the stated performance criteria. Quality Assurance Project Plans commonly apply to data gathering activities associated with projects and lab procedures. QAPPs are commonly needed for laboratory operations, remediation projects, and mitigation projects. QAPPs may contain one or more standard operating procedures.

**Quality Assurance Officer (QAO):** The person in the Science Services Branch of OLQ responsible for ensuring that QA criteria are met. (A-005-OEA-06-P-R0)

**Request for Proposal (RFP) Process:** A procurement method, authorized by Indiana Code (IC) 5-22-9, that provides a formal process for the procurement of goods or services for which price is not the sole factor in the selection of a respondent or respondents. For more information, access IDOA Procurement at <http://www2.idoa.state.in.us/proc/baarfp.htm>. (A-013-OEA-06-P-R0)

**Section Chief:** A first-level Agency supervisor responsible for managing non-supervisory Agency staff. (Universal)

**Sampler:** Individual responsible for the collection and documentation of the sampling event.

**Sampling Equipment:** Various devices used to collect samples as described in USEPA documentation.

**Sampling Event:** The occasion in which environmental samples (soil, sediment, water, etc.) are collected and submitted to a laboratory for analysis.

**Sample Field Sheet (SFS):** The required document identifying a specific sample location during a field sampling event.

**Sample Request Sheet (SRS):** The required document requesting a sampling event.

**Sample Set-Up Chemist (SSC):** The person in the Chemistry Section of OLQ that provides coordination of the sampling event between the project manager and ISDH or contract laboratory.

**Science Services Branch (SSB):** The division within the Office of Land Quality (OLQ) responsible for scientific related technical support.

**Site Information Sheet (SIS):** The required document identifying general information (site name, site number, sample numbers, weather conditions, field equipment, types of samples, etc.) that provides an overview of the field sampling event.

**Site Specific Health and Safety Plan (HASP):** A site specific document outlining and addressing known and suspected hazards in accordance with the requirements of 29 CFR 1910.120.

### 3. Roles

#### Role Title

Chemistry Gatekeeper (An Environmental Chemist (EC))

Sample Set-up Chemist ((SSC) An assigned EC)

Environmental Chemist Supervisor (ECS)

Project Manager (PM)

Section Chief (SC)

Branch Chief (BC)

Assistant Commissioner (AC)

#### Responsibilities:

**Chemistry Gatekeeper (CG):** Responsible for ensuring that the sample request sheet is technically adequate to meet the project objective. The Chemistry Gatekeeper is to provide technical assistance and recommendations for the following: sampling goal/purpose, sample type, number of samples, collection methods, locations, analytical parameters and methods, and any other special considerations.

**Sample Set-up Chemist (SSC):** Responsible for determining the estimated laboratory cost of the requested sampling and analysis event and makes arrangements with the laboratory for analytical services.

**Project Manager (PM):** Person who determines if a sampling event is necessary. The PM then coordinates the sampling event by filling out and acquiring the appropriate signatures, acquiring access agreements, contacting residents, developing a site specific health and safety plan, overseeing, and/or collecting the samples at the site in order to make site decisions.

**ECS, SC, BC and AC:** As appropriate, the Section and/or Branch Chief(s) and/or Assistant Commissioner evaluate the SRS "Reason for Sampling" and the "Projected Cost" to make the determination for approval.

#### Experience requirements:

**EC2:** Two year full-time experience as an analytical chemist in the environmental field.

Substitution: Accredited graduate training in the above areas may substitute for the required experience on a year for year basis.

**EC1:** Four year full-time experience as an analytical chemist in the environmental field.

Substitution: Accredited graduate training in the above areas may substitute for the required experience on a year for year basis.

**ECS:** Five (5) years full-time professional experience as an analytical chemist. At least two (2) years of the above experience must be in an administrative, leadership, managerial or supervisory capacity.

Working knowledge of program requirements and sampling protocols.

**PM:** Working knowledge of program requirements and sampling protocols.

**SC(s), BC(s) and AC(s):** Full-time professional experience in an environmental or environmental public health field; or related field; or related experience. Specified minimal years of the required experience must be in an administrative, leadership, managerial, or supervisory capacity.

**Qualifications and Training requirements:**

**EC2:** Graduation from an accredited college/university plus years of experience. (Major in CHEMISTRY required.)

**EC1:** Graduation from an accredited college/university plus years of experience. (Major in CHEMISTRY required.)

**ECS:** Graduation from an accredited college/university plus years of experience. (Major in CHEMISTRY required.)

**PM:** Full-time professional experience with 5 years in an environmental or environmental public health field or related experience.

**SC(s), BC(s) and AC(s):** Full-time professional experience in an environmental or environmental public health field; or related field; or related experience. Specified minimal years of the required experience must be in an administrative, leadership, managerial, or supervisory capacity.

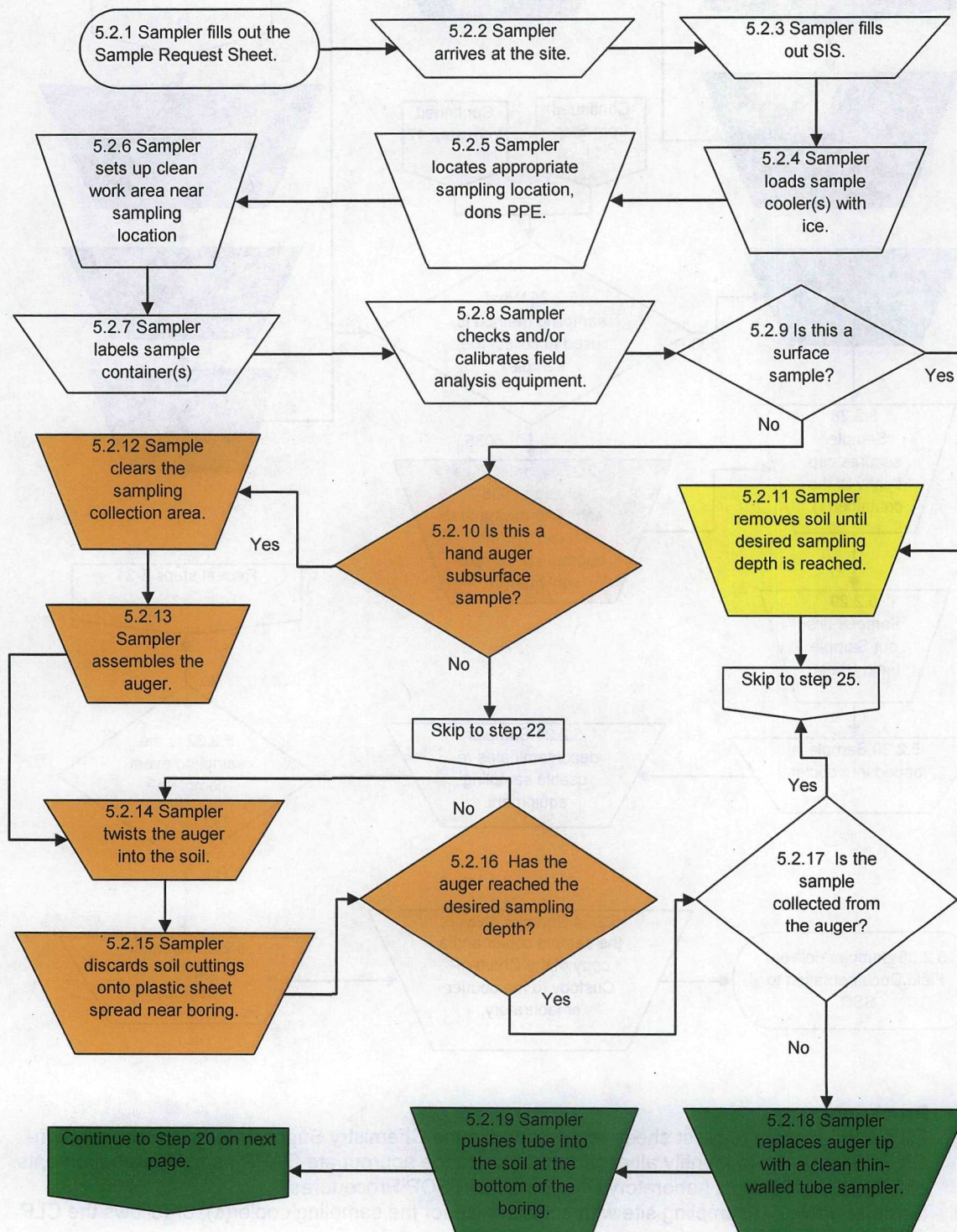
#### **4. Description of equipment, forms, and/or software to be used**

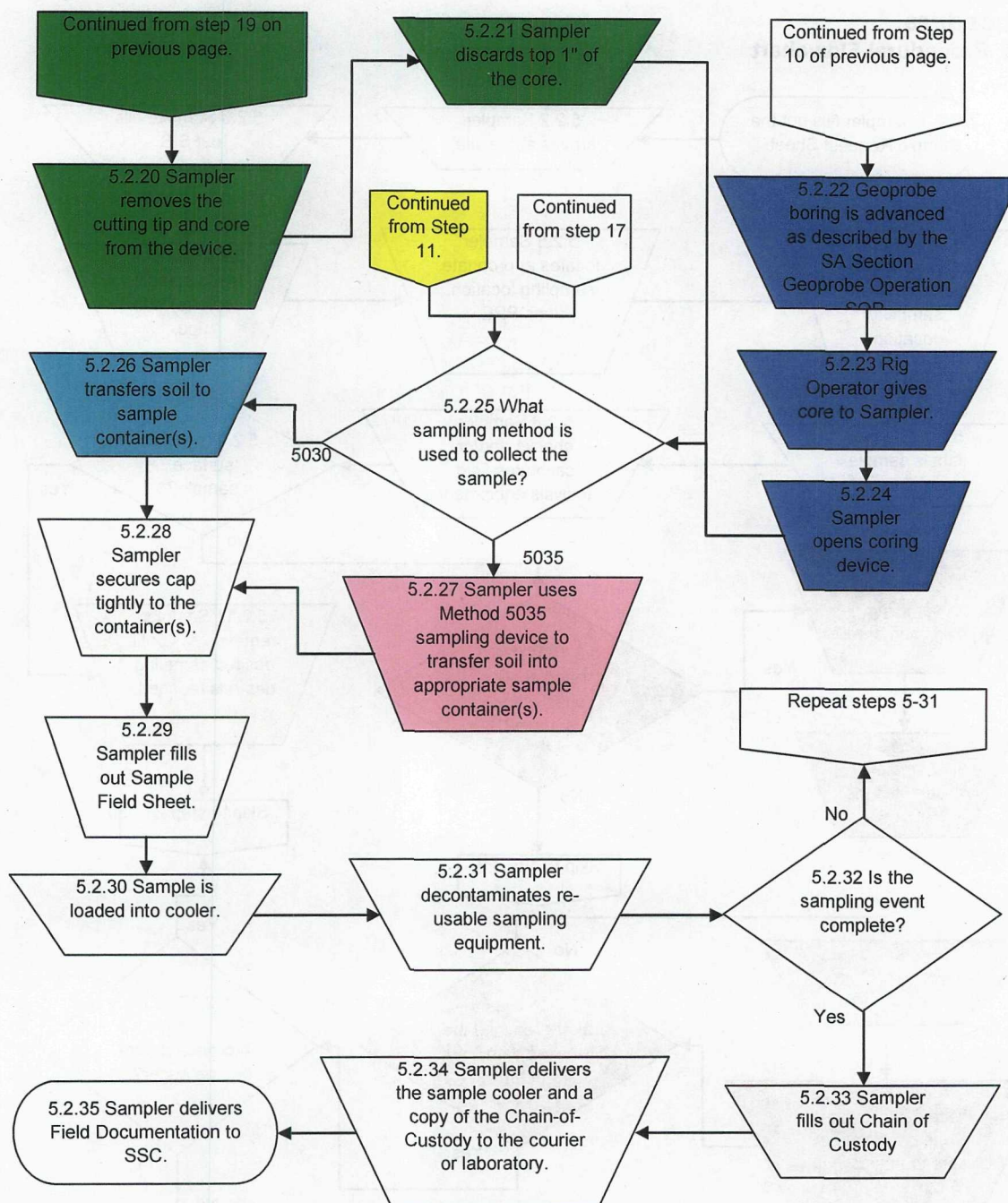
**Equipment:** Sample coolers, sample containers, ziplock-type plastic bags, plastic garbage bags, permanent ink pen/marker, nitrile gloves, paper towels, clipboard, package tape, evidence seals, hand auger, shovel, stainless steel scoop, stainless steel bowl, plastic scoops, plastic spoon, plastic bowls, trowel, ice, thin-walled tube sampler, Geoprobe® Drill Rig, and Method 5035A sampling kits.

**Sheets/Forms:** A copy of the Sample Request Sheet, Site Information Sheet, Sample Field Sheets, Chain-of-Custody Form, Access Agreement, Site Specific Health and Safety Plan (HASP), Pre Contract Laboratory (CLP) Planning Procedures, Field Contract Laboratory (CLP) Planning Procedures, Post CLP/FORMS II Lite.

## 5. Procedure

### 5.1 Procedural Flowchart





## 5.2 Procedure

1. Fill out the sample request sheet as described in the Chemistry Support Sample Request Sign-Off SOP assuring to identify all aspects relative to the appropriate QAPP sampling requirements, or follows the Contract Laboratory Program (CLP) SOP Procedures.
2. Sampler arrives at sampling site with sufficient ice for the sampling cooler(s), or follows the CLP SOP Procedures.
3. Sampler fills out the Site Information Sheet as described in the Chemistry Support Field Documentation SOP, or follows the CLP SOP Procedures.

4. Sampler loads sample cooler(s) with ice to refrigerate samples as they are collected. It is recommended to use a 3:1 ratio of ice to sample containers. Ice may be enclosed in ziplock-type bags and evenly distributed among the samples containers, as they are collected, or follows the CLP SOP Procedures.
5. Sampler locates the appropriate sample collection location and dons appropriate Personal Protection Equipment (PPE), or follows the CLP SOP Procedures.
6. Sampler sets up clean work area near sampling location.
7. Sampler appropriately labels each container to be filled at the sampling location.
8. Sampler checks and/or calibrates all field analysis equipment.
9. Is this a surface sample? If yes, skip to step 11; if no, continue to step 10.
10. Is this a Hand Auger subsurface sample? If yes, skip to step 12; if no, the boring will require the use of a Geoprobe® Drill Rig. Skip to step 22.
11. Sampler removes top layer of soil or debris with a clean decontaminated or dedicated shovel/scoop/trowel until sampling depth is reached. Skip to step 25.
12. Sampler clears the sampling collection area.
13. Sampler assembles the auger.
14. Sampler twists the auger into the soil.
15. Soil cuttings are discarded onto plastic sheet spread near the auger boring.
16. Has the auger reached the desired depth? If yes proceed to step 17; if no, repeat steps 14-15 until desired depth has been reached.
17. Is the sample collected directly from the auger? If yes, skip to step 25; if no, continue to step 18.
18. Sampler replaces auger tip with a clean thin-wall tube sampler.
19. Sampler pushes the tube into the soil at the bottom of the auger boring.
20. Sampler removes the cutting tip and core from the device.
21. Sampler discards the top inch of the core. Skip to step 25.
22. Following the IDEM Geoprobe® Use Policy to reserve the equipment and schedule the driller, the Geoprobe® boring is advanced in accordance with the IDEM Geoprobe® Use Policy.
23. Sampler receives coring device.
24. Sampler opens coring device.
25. What sampling method is used for the sample collection? If Method 5030, continue to step 26; if 5035, skip to step 27.
26. Sampler uses a clean decontaminated or dedicated shovel/scoop/trowel to transfer soil to appropriately labeled sample container as soon as possible after soil exposure to avoid loss of volatiles. Skip to step 28.
27. Sampler uses the Method 5035 sampling device to transfer the appropriate amount of soil into appropriate sample container.
28. Sampler secures cap tightly to each container.
29. Sampler documents the field sheet for each individual sample as described in the Chemistry Support Field Documentation SOP.
30. Sampler immediately places the collected sample containers in ziplock-type plastic storage bags, seals bags, and places the bagged sample containers in the sample cooler.
31. Sampler decontaminates re-usable sampling equipment.
32. Is the sampling event complete? If yes continue to step 33; if no, repeat steps 5-31 until sampling is complete.
33. Sampler fills out Chain of Custody as described in the Chemistry Support Field Documentation SOP, or follows the CLP SOP Procedures.
34. Sampler delivers sample cooler and chain of custody to the laboratory or shipping courier (i.e. FedEx, UPS) drop point, or follows the CLP SOP Procedures.
35. Sampler delivers field documentation to the SSC as described in the Chemistry Support Field Documentation SOP, or follows the CLP SOP Procedures.

## 6. Standards and checklists

IDEM Geoprobe® Use Policy

Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, SW-846, 3<sup>rd</sup> edition

IDEM OLQ Request for Proposal (RFP) 5-102

USEPA CLP National Functional Guidelines

U.S. EPA Soil Screening Guidance: User's Guide

U.S. EPA Environmental Response Team Standard Operating Procedures: Soil Sampling

U.S. EPA Region 9 Laboratory, Field Sampling Guidance Document #1210: Soil Sampling for Volatile Compounds

ASTM D 4700 Standard Guide for Soil Sampling from the Vadose Zone

ASTM D 6282 Standard Guide for Direct Push Soil Sampling for Environmental Site Characterizations

ASTM D 4547 Standard Guide for Sampling Waste and Soils for Volatile Organic Compounds

## 7. Records Management

Upon completion of the verification, validation and the assessment of the data package, the verification and validation memorandum, tables, and all field documentation are attached to the data package and routed back to the PM. The original checklist(s), a copy of the field documentation, and a copy of the verification and validation memorandum are kept in the Chemistry Section. The PM forwards the completed documentation to the IDEM Central Files.

## 8. Quality Assurance / Quality Control

Quality Assurance / Quality Control is monitored by the submittal of the completed field documentation and via the data verification and validation process.

## 9. Continuous Improvement Cycle

### Triggers / Performance measures & standards

The staff within Chemistry Support performing the data verification and validation process reviews the sampling documentation and analytical data for any performance problems. Triggers may include:

- Broken container
- Contaminated equipment blank samples
- Improper holding temperatures
- Inadequate QA/QC samples
- Inadequate number of samples
- Inappropriate analytical method for sampling data quality objective
- Incorrect sample containers
- Cross-contaminated samples
- Misunderstanding between IDEM and the analytical laboratory
- Validation and/or verification of data indicates qualified or unusable data
- Incomplete field documentation
- Field documentation not submitted to SSC.

### Trigger Response

If the same problem is documented on a routine basis, then an investigation of the cause of the problem will be initiated. Evaluation of identified changes will determine whether any action is warranted.

### Modification procedures

The staff within Chemistry Support or the QAO can identify a potential change. The Section QA Contact will be notified and take appropriate action. Results of the investigation will be used to determine whether sampling practices need to be updated, the sampler needs additional training, or laboratory protocols need evaluating.

### Assessment

Changes will be assessed by monitoring the quality of the work product delivered to the peer reviewers and ECS. The Section QA Contact will evaluate the SOP biannually to determine if aspects of the SOP are still accurate, appropriate and applicable.

## 10. References

IDEM OLQ Request for Proposal (RFP) 5-102  
Chemistry Support Field Documentation, P-004-OLQ-S-CH-07-S-R0  
Chemistry Support Sample Request Sheet Sign-Off, M-002-OLQ-X-XX-06-S-R0  
Pre Contract Laboratory (CLP) Planning Procedures  
Field Contract Laboratory (CLP) Planning Procedures  
Post CLP/FORMS II Lite  
IDEM Geoprobe® Use Policy  
Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, SW-846, 3<sup>rd</sup> edition  
USEPA CLP National Functional Guidelines  
U.S. EPA Soil Screening Guidance: User's Guide  
U.S. EPA Environmental Response Team Standard Operating Procedures: Soil Sampling  
U.S. EPA Region 9 Laboratory, Field Sampling Guidance Document #1210: Soil Sampling for Volatile Compounds  
ASTM D 4700 Standard Guide for Soil Sampling from the Vadose Zone  
ASTM D 6282 Standard Guide for Direct Push Soil Sampling for Environmental Site Characterizations  
ASTM D 4547 Standard Guide for Sampling Waste and Soils for Volatile Organic Compounds

## 11. History of Revisions

Revisions: 0

## 12. Appendices

N/A